

Good Load Transient Response Low Voltage 500mA LDO

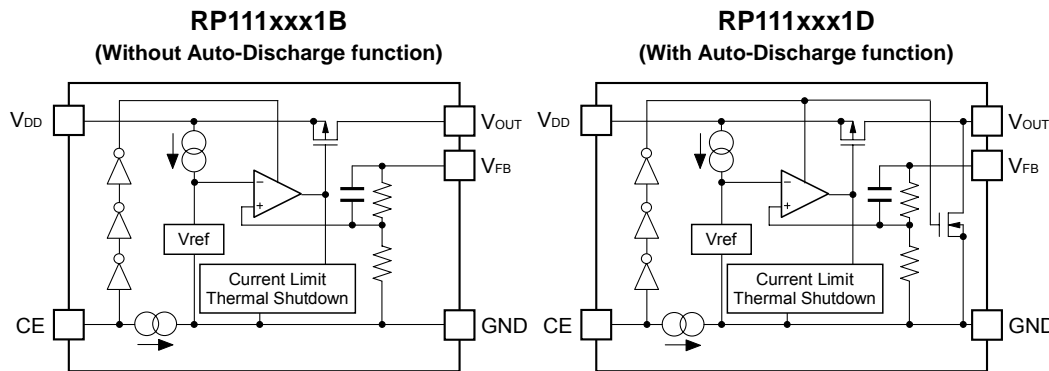
The RP111x Series are CMOS-based LDO regulators featuring 500mA output current. The minimum input voltage is as low as 1.4V and the output voltage can be set from 0.7V. Due to a built-in 0.46Ω (at $V_{OUT}=2.8V$) on-resistor, RP111x can provide a low dropout voltage. RP111x also features a ripple rejection at 75dB and low noise. The output voltage accuracy is as high as $\pm 0.8\%$. The accuracy of output voltage of RP111x including the temperature characteristics and the load transient response has been improved. The Typ. and Max value of under/overshoot according to the various output current are shown in the typical characteristics in the datasheet, therefore the accuracy of the output voltage estimation will be easy on the actual operating cases. In addition to a fold-back protection circuit built into conventional regulators, RP111x contains a thermal shutdown circuit and an inrush current limit circuit. In addition to SOT-23-5 and SOT-89-5 packages, a 1.2mm square DFN1212-6 package is also available. Ceramic capacitors can be used.

FEATURES

- Supply Current (I_{SS}) Typ. 80μA ($V_{IN}=\text{SET } V_{OUT}+1.0V, I_{OUT}=0mA$)
- Standby Current ($I_{standby}$) Typ. 0.1μA (Same as above, $V_{CE}=0V$)
- Dropout Voltage (V_{DIF}) Typ. 0.23V ($I_{OUT}=500mA, V_{OUT}=2.8V$)
- Ripple Rejection (RR) Typ. 75dB ($f=1kHz$)
- Input Voltage Range (V_{IN}) 1.4V to 5.25V
- Output Voltage Range (V_{OUT}) 0.7V to 3.6V (internally fixed)
- Output Voltage Accuracy $\pm 0.8\%$
- Temp. coeff. of Output Voltage Typ. $\pm 30ppm/^{\circ}C$ ($V_{OUT} \geq 1.8V$)
- Line Regulation Typ. 0.02%/V
- Load Regulation Typ. 1mV
- Fold-back Protection Circuit Current limit Typ. 50mA
- Thermal Shutdown Circuit Stops at 165°C
- Inrush Current Limit Circuit Typ. 400mA
- Load Transient Response Accuracy Typ. -75mV/+45mV ($I_{OUT}=1mA \leftrightarrow 250mA$ ($t_r=t_f=0.5\mu s$), $C_{OUT}=1\mu F$)
- Packages DFN1212-6, SOT-23-5, SOT-89-5
- Auto-Discharge function D Version
- Ceramic capacitors can be used. 1μF or more

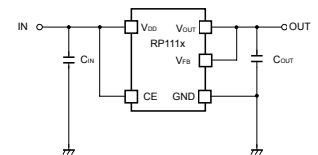
(The above shows specification at $T_{opt}=25^{\circ}C$. Design assurance value at $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$ is also available. For details, please refer to the datasheet.)

BLOCK DIAGRAM

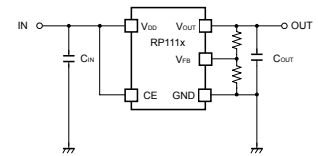


TYPICAL APPLICATIONS

RP111x Fixed output voltage Case



RP111x07x Adjustable output voltage Case



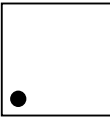
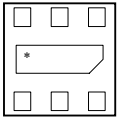
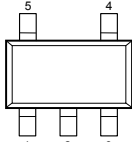
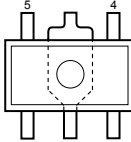
SELECTION GUIDES

Halogen Free	Package	Q'ty per Reel	Part No.
H/F	DFN1212-6	5,000 pcs	RP111Lxx1*-TR
H/F	SOT-23-5	3,000 pcs	RP111Nxx1*-TR-FE
H/F	SOT-89-5	1,000 pcs	RP111Hxx1*-T1-FE

xx : Specify the output voltage within the range of 0.7V (07) to 3.6V (36) in 0.1V steps.

* : Select from (B) without auto-discharge function or (D) with auto-discharge function.

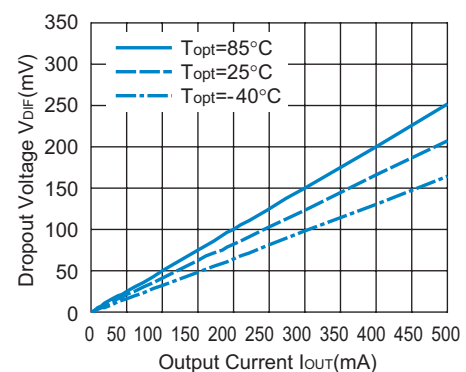
PACKAGES

DFN1212-6	SOT-23-5	SOT-89-5																																
<div><div>Top View</div><div>Bottom View</div></div>																																		
<table><tr><td>1</td><td>V_{OUT}</td></tr><tr><td>2</td><td>V_{FB}</td></tr><tr><td>3</td><td>GND</td></tr><tr><td>4</td><td>CE</td></tr><tr><td>5</td><td>NC</td></tr><tr><td>6</td><td>V_{DD}</td></tr></table>	1	V_{OUT}	2	V_{FB}	3	GND	4	CE	5	NC	6	V_{DD}	<table><tr><td>1</td><td>V_{DD}</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>CE</td></tr><tr><td>4</td><td>V_{FB}</td></tr><tr><td>5</td><td>V_{OUT}</td></tr></table>	1	V_{DD}	2	GND	3	CE	4	V_{FB}	5	V_{OUT}	<table><tr><td>1</td><td>V_{FB}</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>CE</td></tr><tr><td>4</td><td>V_{DD}</td></tr><tr><td>5</td><td>V_{OUT}</td></tr></table>	1	V_{FB}	2	GND	3	CE	4	V_{DD}	5	V_{OUT}
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*) The tab is substrate level (GND)

TYPICAL CHARACTERISTIC

RP111x281x Dropout Voltage vs. Output Current



APPLICATIONS

- Power source for hand-held communication equipment, cameras, and VCRs
- Power source for battery-powered equipment
- Power source for home appliances and digital home appliances

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TRANSIENT RESPONSE

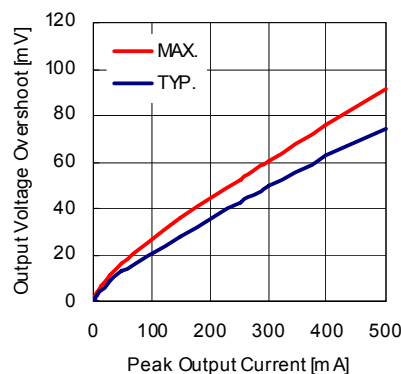
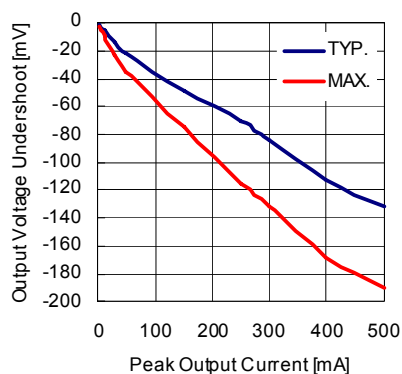
The RP111x Series have been improved in overall output voltage characteristics including temperature and transient response.

The load transient response indicated under the Electrical Characteristics is guaranteed by design based on the condition when I_{OUT} changes from 1mA to 250mA or 250mA to 1mA.

Please refer to the datasheet for the output voltage change on other load conditions.

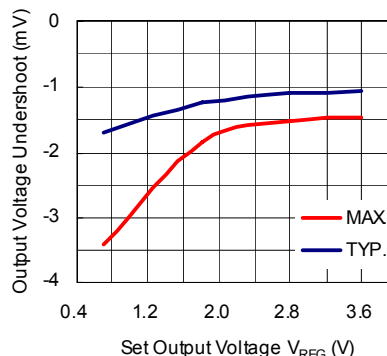
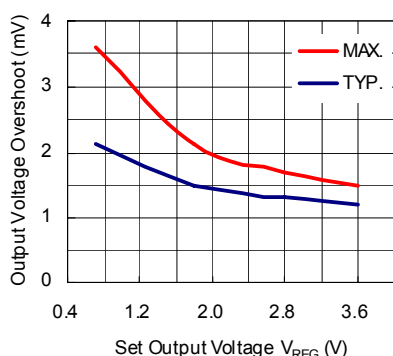
RP111x281x

$V_{IN}=3.8V$, $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$, $C_{IN}=1.0\mu F$, $C_{OUT}=1.0\mu F$, $I_{OUT}=1mA \Leftrightarrow$ **Peak Output Current** ($t_r=t_f=0.5\mu s$)



Input Transient Response has the output voltage dependency. Please refer to the characteristics examples below.

$V_{IN}: 3.3V \Leftrightarrow 4.3V$ ($t_r=t_f=5.0\mu s$), $V_{IN} \geq 1.4V$, $C_{OUT}=1.0\mu F$, $I_{OUT}=30mA$



The graphs shown above are reference data.

For the better transient response, a capacitor with higher capacitance is recommended and the wire impedance of GND and V_{OUT} should be minimized as possible.

The transient response characteristics depend on the external parts and PCB layout. Therefore, the operating conditions for the transient response in the application should be considered and evaluation is necessary.

Ricoh Co.,LTD. Electronic Devices Company



■ Ricoh presented with the Japan Management Quality Award for 1999.
Ricoh continually strives to promote customer satisfaction, and shares the achievements of its management quality improvement program with people and society.



■ Ricoh awarded ISO 14001 certification.
The Ricoh Group was awarded ISO 14001 certification, which is an international standard for environmental management systems, at both its domestic and overseas production facilities. Our current aim is to obtain ISO 14001 certification for all of our business offices.



Ricoh completed the organization of the Lead-free production for all of our products. After Apr. 1, 2006, we will ship out the lead free products only.
Thus, all products that will be shipped from now on comply with RoHS Directive.

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